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SITEWORK SUMMARY REPORT

for the

Northwest University Master Plan Update

5520 108th Avenue NE
Kirkland, WA 98029

TEC Project #: 669-GHA

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OVERVIEW

This Sitework Summary Report is part of the Northwest University's Master Plan Update. It addresses utility requirements for the planned future facilities, including power, water, sanitary sewer, and storm drainage mitigation.

PREVIOUS MASTER PLAN DOCUMENTS

The university campus includes utility services that have been installed and/or modified through the years for many different campus improvement projects. Most of these utility services were designed and constructed in accordance with the codes in place at the time of permit application. However, in 2002, the University produced a campus-wide utilities report, documenting existing water, sanitary sewer, and storm drainage facilities and identifying future expansions and upgrades that would be necessitated by the facilities identified in the then-current master facilities plan.

Water: Significant water supply improvements were made when the Health and Science Building was constructed in 2006, which will benefit the future development anticipated in this Master Plan Update. The proposed tennis center will require that a small portion (approximately 180 lineal feet) of the existing water pipe network be relocated/realigned. A new watermain will need to be extended a distance of approximately 725 lineal feet in the driveway that separates the athletic from academic portions of the Master Plan improvements in order to provide water service to the buildings of Phases 2, 3, 4 and 7.

All of the buildings proposed in the Master Plan Update should be able to connect water services from the existing on-site network, with the possible exception of the tennis center building which may be more efficiently served from an existing public watermain located in 53rd Street NE.

Sanitary Sewer: An existing sewer main traverses the Master Plan area and will be available to serve the buildings proposed for phases 2, 3, 4, 6 and 7. However, this existing sewer main will require relocation/realignment to accommodate the footprint of the Phase 2 Gymnasium building. Also, the relocation of this sewer main can correct a condition where it currently crosses a portion of the neighboring BEST High School property to the west. Realigning approximately 820 lineal feet of sanitary sewer will address these issues.

The Phase 1 Tennis Center building may be best served for sewer from an existing public main located in 53rd Street NE. And phases 5 and 8 will likely be able to reuse, or connect to existing building services at those locations.

Electrical Power: To improve aesthetics along the 53rd Street NE frontage, the University proposes to reinstall the current overhead 3-phase power, and miscellaneous communications lines underground for a distance of approximately 750 lineal feet. Existing overhead power lines just east of phases 1 and 7 will have to be relocated/realigned for those buildings, and it may be prudent to reinstall them underground at that time.

Storm Drainage: The facilities identified in this Master Plan Update are generally similar to the ones anticipated in the previous Master Utilities Report but the university has completed several building projects in the interim, and also constructed the large regional detention pond located north of the main campus entrance road. This pond was sized to mitigate all the tributary runoff from the anticipated future projects in the campus-wide master plan at that time. At the City's request, it also included additional storage volume to reduce the runoff leaving the site, such that the downstream peak runoff (crossing 108th Avenue NE) would be 20 cfs or less. This was done to minimize the potential for additional erosion damage at an erosion-sensitive location downstream of the campus. The pond that was built was even larger than planned, so there is excess volume in the pond, based on the sizing criteria applicable at the time.

2016 DRAINAGE DESIGN CRITERIA

Since the publication of the previous campus-wide utilities report, the City's drainage detention design criteria have become more stringent, requiring that developed runoff be detained such that the runoff flow duration matches the historic runoff from the developed area assuming the historic forested condition for all flows from ½ of the 2-year storm through the 50-year storm. All projects are also now required to implement drainage Best Management Practices (BMPs) to new impervious surfaces.

MASTER PLAN FACILITIES

The 2016 Master Plan Update divides the University's future improvements into 8 phases.

Phase 1: Tennis Center

This project is located at the south side of the campus along NE 53rd Street, and due to topography, is not tributary to the existing detention pond.

Phase 2: Pavilion/Gymnasium Replacement

This project is located north of the Phase 1 Tennis Center and will replace the existing gymnasium/pavilion at approximately the same location. An Athletic Plaza area is also proposed on the east side of this building, which will connect this facility to the Phase 7 Fitness Center.

Phase 3: Welcome Center

This project is located north of the Phase 2 Pavilion/Gymnasium, at the end of the entrance boulevard and will replace the existing Pecota Student Union Building at approximately the same location. A Campus Commons Plaza is also proposed on the east side of this building, which will connect this facility to the future Phase 4 New Residence Hall.

Phase 4: New Residence Hall

This project is located east of the Phase 3 Welcome Center, both west and south of Millard Hall. The Phase 3 Campus Commons Plaza will connect this facility to the Phase 3 Welcome Center.

Phase 5: Turf Fields and Field House

This project is located on the east side of the campus, north of the Barton Building, and will replace the grass athletic fields, with turf and maintain and improve the existing turf field which was built by the Seahawks and covered with an air-filled dome.

Phase 6: Chapel Additions

This project will make additions to north and south sides of the existing Butterfield Chapel, which is located on the south side of the campus, just east of the Phase 1 Tennis Center and the Phase 7 Fitness Center.

Phase 7: Fitness Center

This project is located east of the Phase 2 Pavilion/Gymnasium. The Phase 2 Athletic Plaza will connect this facility to the Phase 2 Pavilion/Gymnasium Replacement.

Phase 8: Ness Hall Replacement

This project is located east of the Argue Health Sciences Center, and will replace the existing Ness/Williams/Dickey/Fee Hall at approximately the same location. This replacement is planned in 3 phases.

ANTICIPATED FUTURE DRAINAGE MITIGATION REQUIREMENTS

The existing detention pond was designed to accommodate runoff from the future facilities planned at that time; however, additional detention is now likely to be required for two reasons. First, this Master Plan Update includes more impervious surface area than was identified in the previous master plan; and second, the existing detention pond was designed using less stringent criteria than is currently required. The existing pond does include some additional storage beyond what was required at the time, but not enough to accommodate all the projects currently envisioned.

This report reassesses the existing detention volume in the context of the current drainage code and identifies how each Master Plan Update phase might be accommodated, either in the existing pond, or with separate stand-alone detention facilities.

The size of the facilities described below may be conservative because they do not include potential credits for flow control BMP's. BMP's, such as permeable pavement, raingardens, and green roofs are required under current code, and usually reduce the detention requirements for a project. The extent of any reduction can only be determined by more detailed design analysis.

PHASE BY PHASE ASSESSMENT OF DETENTION REQUIREMENTS

The existing detention pond design required a minimum detention volume 80,736 cubic feet (based on the then-current drainage code). And the design volume was expanded beyond the minimum requirement by 18,147 cubic feet to meet the City's request to limit downstream flows crossing 108th Avenue NE to 20 cubic feet per second or less. However, as-built documentation of the pond volume showed the total pond volume to be 103,086 cubic feet, which means that the pond contains 84,939 cubic feet (103,086 cf minus 80,736 cf) of detention volume that is available to mitigate runoff from the university campus.

Projects already contributing runoff to the detention pond include the Health Science Center building, Loop Road, and Duplexes. In 2002, the drainage report prepared for those projects identified that the impervious surfaces installed were less than anticipated in the pond design. We determined for this analysis, based on tributary areas, that these facilities represented 30 percent of the designed 80,736 cubic feet of detention volume, or 24,499 cubic feet. This means that there is 60,440 cubic feet of storage remaining in the pond, that is available to mitigate runoff from future projects.

Following is an assessment of the detention requirements for the facilities presented in the Master Plan Update on a phase by phase basis.

Phase 1: Tennis Center

This project is not tributary to the existing detention pond, and so must provide separate detention that will discharge to the existing storm drain system in NE 53rd Street. Preliminary detention sizing, based on a 1.98-acre area, with 1.24 acres of impervious surfaces suggests that 25,695 cubic feet of detention storage will be required. This might be provided in an underground vault, 8-feet deep by 20-feet wide, by 161-feet long. Treatment of runoff should not be required of this project because all the parking pavement is beneath the building, and not exposed to rainfall.

Phase 2: Pavilion/Gymnasium Replacement

Preliminary detention sizing, based on a 1.67-acre area, with 1.16 acres of impervious surfaces suggests that 23,138 cubic feet of detention storage will be required. This project

would naturally drain to the existing detention pond, and so after completion of this project, 37,302 cubic feet of storage would remain in the pond, available for future projects.

If the Athletic Plaza area that is proposed on the east side of this building is constructed with permeable pavement, and/or if the building were to include a green roof, then the detention requirement would be reduced and more storage would remain available for future projects.

Treatment of runoff would not be likely be required of this project because parking is proposed beneath the building, where it is not exposed to rainfall.

Phase 3: Welcome Center

Preliminary detention sizing, based on a 0.98-acre area, with 0.80 acres of impervious surfaces suggests that 15,062 cubic feet of detention storage will be required. This project would also naturally drain to the existing detention pond, and so after completion of this project, 22,240 cubic feet of storage would remain in the pond, available for future projects.

If the Campus Commons Plaza area that is proposed on the east side of this building is constructed with permeable pavement, and/or if the building were to include a green roof, then the detention requirement would be reduced and more storage would remain available for future projects.

Treatment of runoff would not be likely be required of this project because parking is proposed beneath the building, where it is not exposed to rainfall.

Phase 4: New Residence Hall

Preliminary detention sizing, based on a 0.91-acre area, with 0.59 acres of impervious surfaces suggests that 10,451 cubic feet of detention storage will be required. This project would also naturally drain to the existing detention pond, and so after completion of the project, 11,789 cubic feet of storage would remain in the pond, available for future projects.

Treatment of runoff would not be likely be required of this project because no new parking is proposed.

Phase 5: Turf Fields and Field House

The City of Kirkland requires that artificial turf be modeled for detention sizing as 25% impervious. Preliminary detention sizing, based on a 5.55-acre area, with 1.47 acres of impervious surfaces suggests that 46,744 cubic feet of detention storage will be required. This is significantly more than the 11,798 cubic feet of detention storage that is estimated to be remaining available in the pond after Phase 4, and so separate detention will be required for this project, regardless of whether the available detention volume in the pond is utilized. The best solution for this project appears to be to install a detention vault as part of this project. The required detention could be provided in an underground vault, 8-feet deep, by 30-feet wide, by 200-feet long.

Treatment of runoff is also likely to be required of this project because artificial turf utilizes bituminous products, and so its runoff can negatively impact runoff water quality. Treatment could be included in the detention vault by making a portion of it deeper than 8 feet and adding a sand filter facility.

Phase 6: Chapel Additions

This project is relatively minor, and preliminary detention sizing, based on a 0.27-acre area, with 0.07 acres of impervious surfaces suggests that 1,206 cubic feet of detention storage will be required. This project area naturally drains to the existing detention pond, and so

after completion of the project, 10,584 cubic feet of storage would remain in the pond, available for future projects.

Treatment of runoff would not be likely be required of this project because no new parking is proposed.

Phase 7: Fitness Center

Preliminary detention sizing, based on a 0.55-acre area, with 0.44 acres of impervious surfaces suggests that 8,382 cubic feet of detention storage will be required. This project would also naturally drain to the existing detention pond, and so after completion of the project, 2,202 cubic feet of storage would remain in the pond, available for future projects.

Treatment of runoff would not be likely be required of this project because parking is proposed beneath the building, where it is not exposed to rainfall.

Phase 8: Ness Hall Replacement

Preliminary detention sizing, based on a 1.30-acre area, with 1.08 acres of impervious surfaces suggests that 20,148 cubic feet of detention storage will be required. This is more than the 2,202 cubic feet of detention storage that is calculated to be remaining available in the pond after Phase 7, and so additional detention will be required for this project. This can be provided in an underground vault, 8-feet deep by 20-feet wide, by 126-feet long, or by expanding the existing pond. However, since this project is proposed to be completed in phases, perhaps one of the phases could be accommodated in the existing pond, and the remaining phases accommodated in a vault.

Treatment of runoff would not be likely be required of this project because no new parking is proposed.